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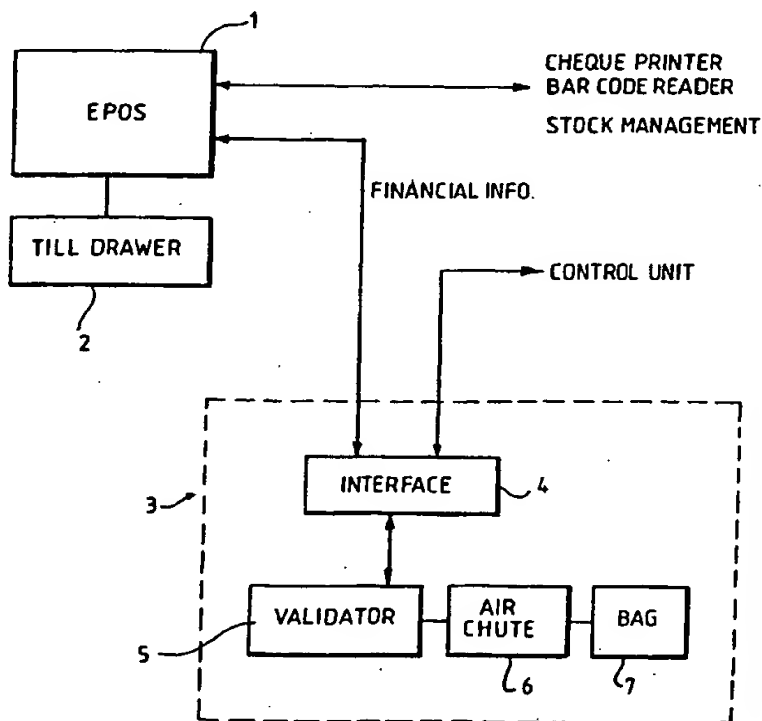
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(54) Title: TRANSACTION MANAGEMENT SYSTEM

(57) Abstract

Transaction management system, especially for use in a retail outlet. A station is provided at a sale point, the station including a means for entering transaction information, including the value of the transaction and the method of payment, a secure unit (3) for receiving and identifying payments received, and storing the payments received in a tamper evident package (7) in an identifiable manner including the type and value of the payments and a means for communicating the transaction information and identification of the payments stored in the tamper evident package (7) to a central control unit.



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TRANSACTION MANAGEMENT SYSTEM

The present invention relates to a system for management and control of transactions, especially retail transactions.

5 In a normal retail environment, such as a supermarket, there are a number of individual sales points, each of which include a till. These tills may have an Electronic Point Of Sale (EPOS) system by which the tills are connected on a network to a central unit. Details of transactions, including the items sold, the value of the items sold and the type of payment, for example cash, credit or debit card, cheque or coupon are transmitted to the central unit. Information
10 relating to the products sold may be used to control the ordering of further stock. Details of the type of payment and value of the transactions are used to balance the tills at the end of trading.

Each day, a float is provided at each till. During trading, cash payments, cheques, coupons and card payment slips are added to the till, and change is
15 given from the cash in the till. There is a security risk in having a large amount of money in the till, as the till is vulnerable to attack. It is normal therefore for some notes to be removed periodically from the till and the shop floor. Typically, an unknown amount of money is removed from the till for this purpose. This may be achieved either by a store supervisor visiting the till
20 and removing money from the till and taking this to the cash office, by the till operator placing the money in a secure cash box provided at the till site from where the money can be removed by a supervisor, or by placing the money in a canister which is then transported off the shop floor, for example through air tubes.

25 At the end of the trading day, the money remaining in each till, together with the money taken from the till during the day, is collected and counted. This money is then compared with the amount of money that is calculated from the

EPOS records to have been received. Similarly, each of the cheques, credit and debit card slips and coupons are collected, added together and compared with the number and value of the associated transactions from the EPOS system.

- 5 The till floats are then replenished for the following day's trading. The money, cheques, credit and debit card slips and coupons are collected and bagged as required for the bank or other institution where the money is to be received, before being sent to the bank or other institution to be credited to the store's account.
- 10 It will be appreciated that, especially for large stores with a large number of tills and a high turnover, the counting and balancing of payments received with the EPOS totals is a very time consuming operation. For a store having five till points, the time spent in counting and balancing the cash transactions alone can be in excess of 20 hours per week.
- 15 In an attempt to reduce the amount of time spent counting and balancing payments after the close of the store for the day, it is usual that, where money is removed from the till throughout the day, this cash is counted after removal. Nevertheless, this does not reduce the overall amount of time that is required to count the money.
- 20 Also, it is not uncommon for the counting and balancing of the transactions to be deferred until the following day. This is especially the case where stores are open until late in the evening, in which case it is cheaper to pay staff to balance the tills during normal hours the following day than late in the evening when pay rates are higher. In this case, the money is not counted until the
- 25 day following that when it is received, the money is often then dispatched to the bank the following day, where the money is counted before being credited to the store's account. Therefore, the length of time in processing the money

means that the money is not credited to the store's account until some days after the money has been received.

A problem with such conventional systems remains security. It is unsafe to leave large amounts of money on the shop floor, as this is an easy target for a thief. Nevertheless, the removal of money from the tills and transportation of this across the shop floor is also a potential security risk as the money is especially vulnerable during this time. Also, the large amount of money in the till where it is easily accessible to the till operator means that there is the risk of money being removed by the till operator. As the money in the till is not balanced until the end of the day's trading, it is often impossible to determine when money went missing, and it is therefore impossible to determine who took the money. The only way to avoid this problem is to carry out a complete balancing of the till every time a new operator begins work, but this is often impractical given customer demands for tills to be opened during busy periods. A further security risk occurs within the store's cash room where all the money is collected, counted and balanced. Again here it is possible for staff to take money, and it cannot be determined where or when the money was taken and by whom.

A further problem facing all retail outlets is that of forgery, since it is normal merely to carry out a visual inspection of cash received to determine its authenticity. With increasing sophisticated forging, this is not sufficiently reliable.

Similar problems apply with other transaction types, for example cheque and credit and debit card payments. In this case, the time consuming process of counting the number and value of the transactions and collecting these together to send to the bank is still incurred. There is also a similar security risk, although to a lesser extent than with cash, as the cheques and card

payment slips are made in favour of the store and so cannot be used easily by an unscrupulous member of staff.

According to the present invention, a transaction management system comprises a station at a sale point and a control unit, the station comprising:

5 a means for entering transaction information, including the value of the transaction and the method of payment;

 a secure unit for receiving and identifying payments received, and storing the payments received in a tamper evident package in an identifiable manner including the type and value of the payments; and

10 a means for communicating the transaction information and identification of the payments stored in the tamper evident package to the control unit.

With the system of the present invention, when a transaction is complete, the till operator is able to input to the system the type of payment, for example a
15 cash payment. When the payment is received, this may be identified to the system, and then stored in a secure, tamper evident package. The payment tendered is transmitted to the control unit. As the payments received are provided in a tamper evident package, are identified and their identity is transmitted to the control unit, it is possible to reduce the amount of counting
20 and balancing required at the end of trading, since the amount and type of payment received and contained in the tamper evident package can be determined merely from the amount calculated by the control unit.

It is preferred that the system includes a station at each of a plurality of sales points, the stations being connected to a single control unit. In this way, the
25 same control unit can carry out the processing for a number of points of sale.

In this case, each individual station is preferably connected to the control unit over a network.

It is advantageous that the control unit records not only the nature and value of the transaction, but also the time of the transaction. In this case, if there is a discrepancy, it will be easier to identify when that discrepancy occurred. Further, it is preferred that each till operator is required to log on when they are to carry out transactions at a station, and in this way the operator responsible for a discrepancy may be identified easily. In this case, if an operator is not working in accordance with a normal procedure, this can be identified and appropriate training given.

The system may be arranged so that payments of a particular type are stored in the secure unit and other payment types are stored and processed in a conventional manner. Alternatively, a number of different types of payment may be stored and handled in one or more secure units.

In one example of the present invention, the secure unit may be provided for handling cash payments, in particular note payments. In this case, the secure unit may include a means for determining the value of the note. The means, or a further means, may determine the authenticity of the note. The note, once its value and/or authenticity have been determined, may then be passed to the tamper evident package. In this case, if the operator indicates that a payment is to be made by cash, and the note handling means such as a validator does not receive a note, this absence of a note may be passed to the control unit to identify an error, either a breach in procedure, for example the operator indicating the wrong type of transaction or putting the money directly in the till, both of which can be corrected by appropriate training, or a breach of security, for example the operator taking the money. Since the time

of the breach may be identified to the system, the operator responsible for the breach can be identified.

When the note handler receives a note and determines that the note is unacceptable, for example if this is a forgery, the note is preferably rejected.

- 5 In this case, the system is able to identify forged notes that are tendered, and therefore can potentially reduce significantly or eliminate the store's loss due to forged notes.

- The secure unit may alternatively or additionally be provided for receipt of other identifiable forms of payment. For example, it is common for stores to
- 10 have a printer for printing cheques and credit and debit card slips. In this case, the secure unit may be provided with an optical character recognition system that identifies the value printed on the cheque or slip before the cheque or slip is passed into the tamper evident package. More preferably, an identification mark may be printed additionally on each cheque or slip
- 15 printed by the system, for example in the form of a bar code. This additional information may include the value of the transaction, the number of the transaction and the customer's details, including for example their name and bank sort code. This information may be read by a suitable decoder, for example a bar code reader, provided in the secure unit.

- 20 In an embodiment of the present invention, non-cash payments may be handled in a conventional manner, for example by the operator placing these in a till drawer. The system may include a handling unit in the cash room, the handling unit having a means to identify parameters of the payment, and a tamper evident package. In this case, the non-cash payments from a number
- 25 of stations can be collected and fed into the handling unit where each payment is identified and stored in the tamper evident package in an identifiable manner.

At the or each sales point, there may be provided a single secure unit for receiving payments of a single type, for example cash payments, a number of different secure units for transactions of different types, for example one secure unit for cash, one for cheques and one for credit and debit card
5 vouchers, or one or more secure units which are able to handle a number of different types of payment.

In a preferred example, the tamper evident package is a bag or other container provided within the secure unit. In the case where the unit is able to handle payments of different types, all of these different types of payment
10 may be received in a single bag or container, or may be stored in separate bags or containers. This depends on the requirements for payment sorting, for example by the bank in which the payments are to be deposited. By providing the payments in a store such as a bag or container within the unit, the payments can be removed from the unit as a single item, rather than
15 being removed individually. This is advantageous as it increases the ease and speed with which the payments can be removed, and ensures that all payments are removed from the unit, without leaving any behind.

It is preferred that the tamper evident package is sealed before it can be removed from the secure unit. By sealing the package before it is removed
20 from the secure unit, it is extremely unlikely that access can be obtained to the package without this access being evident. This ensures that the amount of payments contained in the package corresponds to the amount determined by the system to have been entered into the tamper evident package. If there has been any attempt to remove items from the store, this will be visible and
25 tamper evident and the contents can be checked.

It is preferred that the tamper evident package is made of a plastics material, such as polythene. In this case, the bag or container forming the store can be

sealed by a heat seal unit, an infra-red seal unit, chemical sealing unit, by pressure sensitive adhesive or by vacuum sealing. A sensor arrangement is advantageously provided to ensure no items are present in the region to be sealed before the package is sealed, since any items present at the point of
5 seal may be damaged during sealing, or may prevent the formation of a proper seal.

It is preferred that the seal includes some form of unique identification, for example a unique identification code embedded in or printed on the seal. In this way, it will be difficult for the seal to be broken and the package re-sealed
10 without this being evident as it will be difficult to replicate the unique identification.

A lock is advantageously provided on the secure unit, for example an electronic lock, which is only released after the tamper evident package has been sealed. In this way, access to the package is prevented until the
15 package has been sealed.

It is preferred that the tamper evident package includes individual identification, for example in the form of a bar code. Such identification may be embedded into the package. In this way, the contents of the tamper evident package can be determined from the identity of the package and the
20 log of payments provided to the control unit. The identification may be stored in a chip or other memory device. In this case, the memory device may also record details of the content of the package, for example the details sent to the control unit. In this way, if there is a breakdown in the system, for example if the control unit fails, there will be a record of the contents of the
25 package.

Alternatively or additionally, a printer may be provided to print an identification on the package. The time and/or date on which the package was loaded into

the unit and/or that on which the package was removed from the unit, and/or the content of the package may alternatively or additionally be printed on the package. Such printing may be achieved using a thermal or other printer.

5 The secure unit may include a fluid powered, preferably gas powered, delivery system to transport the notes, cheques, slips, or coupons from the identifier or validator to the tamper evident package.

10 Such a delivery system preferably comprises a channel through which items are to be conveyed and a pair of gas inlets provided on opposite sides of the channel, inclined to the angle at which items are to be conveyed, such that gas from outside the channel is jetted through the inlets to produce a gas flow through the channel which entrains an item to convey this through the channel.

15 In one embodiment, the gas inlets are in the form of pipes or tubes provided at opposite sides of the inlet end of the channel and angled towards a centre plane of the channel. In this case, the gas flows from the inlets will converge towards the centre of the channel, and then flow through the channel. When an item is presented to the channel, this will be entrained by the flow of gas through the channel.

20 Alternatively or additionally, the channel may include an array of fluid flow openings provided on its upper and lower face. The channel is provided within a duct into which air or other fluid is driven, preferably by fans or blowers, to create a region of high fluid pressure surrounding the channel. The openings in the channel are angled with respect to the longitudinal plane passing through the channel and to the plane normal to the channel.
25 Accordingly, the air or other fluid from the high pressure region around the channel is jetted into the channel to give a generally vertical component of fluid extending upwardly from the lower face and downwardly from the upper

face, and jets passing longitudinally through the channel. In this way, a note or other piece of paper or the like passing through the validator or identifier will be received within the channel and will be suspended between the upper and lower faces of the channel by the generally vertical component of the fluid entering the channel through the openings. The note will be entrained by the component of fluid passing through the channel to pull the note from the validator or identifier, through the channel and into the tamper evident package. It has been found that the fluid delivery system is much better than a physical delivery system relying on transportation of the note or voucher by endless belts or rollers as it conveys the item more reliably.

The openings may be in the form of an array of holes, much like a cheese grater. The fluid will jet through these holes to convey the note. Alternatively, the openings may be in the form of elongate slots extending substantially across the width of the channel. The advantage of slots is that the area through which the fluid enters the channel is larger, giving a greater volume of fluid to convey articles through the channel. Nevertheless, the resulting velocity of the fluid flow will be lower compared to that where holes are used.

Where a fluid delivery system, and in particular an air delivery system, is used to deliver the notes to a bag or container forming the tamper evident package, the bag or container must include a fluid outlet through which the fluid entering the bag or container is discharged. It is preferred that the fluid outlet is in the form of holes provided in the wall of the bag or container, although, where the fluid is gas, they may be in the form of a gas permeable membrane. Where holes are provided in the bag or container, these should be of a size such that items contained within the bag or container cannot be removed through the holes.

It is preferred that the fluid outlet provided within the bag or container is provided at the upper part of the bag or container remote from the inlet. It has been found that in this way, when the fluid enters the bag or container, turbulence is created within the package which forces the entrained note, voucher or the like downwards within the bag or container, and compresses items already in the bag or container towards the bottom of the bag or container. If the outlet is provided at other locations within the bag or container, it has been found that this effect is reduced. If the outlet is provided too low within the bag or container, the outlet is liable to become blocked as items are introduced into the bag or container.

The provision of fluid outlets and their location apply for other forms of tamper evident package.

Further detail of a secure unit, feed mechanism and tamper evident package are disclosed in our co-pending International Patent Application claiming priority from British Patent Application No. 9903317.7.

At each sales point, there is advantageously provided a display, for example a liquid crystal display unit, on which details of the verification or identification of the payment may be displayed. This is particularly advantageous as any dispute over the amount tendered can be resolved by viewing the details of the verification. For example, if a customer pays with a note of one denomination, and then suggests that he paid with a note of larger denomination and therefore requires more change, the value of the note which was determined by the validator can be seen on the display to resolve the argument. The display may also be arranged to show instructions for the operator, and show the reason for any rejection of a note or other type of payment. It is preferred that a number of details are displayed on the display,

for example by scrolling these, giving a history. A printer may also be provided to print a hard copy of all displayed messages.

- The system may also allow communication between a till operator and the control unit. For example, if an operator requires additional change, often in the form of coinage, the operator is able to transmit a message to the control unit that such change is required, and this change can be delivered to the operator. This is much quicker than the operator calling a supervisor, advising the supervisor of their requirement, and the supervisor obtaining the required change.
- 10 The system may be controlled to maintain the level of the float at the or each point of sale. During some transactions, it will be necessary for money to be removed from the till and given to the customer, for example in the form of change for a cash transaction, and where a customer requires cash from their credit or debit card account. Accordingly, the level of cash in the till will
- 15 reduce so the till operator may be unable to give the change required. By determination of the amount of cash removed from the till, for example as change, based on the EPOS details and the payments received, the system is able to determine the current level of cash in the till. When the level of cash falls below a predetermined level in comparison to the initial float, money may
- 20 be returned to the till to make up the deficit. For example, if a till has an initial float of £250, cash will be removed from this during trading and returned to customers. The system may determine when the level of cash has fallen to £200. In this case, when further cash is received as a payment and is inserted in the secure unit, the secure unit, after checking the value and/or
- 25 authenticity of the note or notes as required is controlled to return these to the till operator or directly to the till rather than passing these to the tamper evident package, and the till operator may then add these to the till, thereby maintaining the float at a generally constant level. Especially towards the end

of trading, the allowable difference between the actual and the original float level may be reduced, so that the end of trading float corresponds closely to the start of day float. This means that will be minimal differences to make up before the next trading session starts. By automatically topping up the till float
5 in this way, the average level of the till float can be reduced, since it is not necessary to have a large initial float to allow for removals. This reduces the security risk. Where the system includes a display unit, the instruction to return money to the till can be displayed on the system.

The system may also be used to control the dispensing of coinage as change
10 at each sale point. In this case, a coin dispense system including an array of coins of different denominations may be provided at each sale point. When a cash transaction is indicated, the amount tendered is either entered manually by the till operator or is determined by a validator, and the change required is calculated as the difference between the two. The system is then able to
15 compute how the change may be given from the coinage contained in the coin dispenser, and the appropriate coins are dispensed in any known manner. The coin dispenser may also be used to collect, verify and/or sort coins received in payment. In this case, all coins received as payment may be put into a coin sorter and/or verifier which determines the value of the coins
20 received, calculates any change required in the normal manner, and sorts the coins by denomination and stores these in the array for future use as change.

The control unit collates details of all transactions, including for example the number and time of the transaction, the value of the transaction, the method of payment and the details of the location of the payment, for example in the
25 till or in the or each tamper evident package. From this, the system is able to determine the total value and type of payment in any tamper evident package. Therefore, it is possible for the store containing payments to be removed, and the total value and nature of the payments contained to be known

automatically by the system without the need for the payments to be counted. The payments contained in the tamper evident package can then be deposited directly with the bank, and their contents identified with reference to the identity of the tamper evident package without the need to balance or count the payments. This provides a substantial decrease in the amount of time required to process the payments, and a substantial increase in security since the payments are always contained in a secure, tamper evident package and there is minimal handling of cash by members of staff. It is also possible for the information relating to the content of the individual packages to be downloaded to the bank or other destination immediately. It is therefore possible for the system, overnight, to inform the bank of the identity of the packages to be sent to the bank, and the content of each package, without the need for any counting or balancing following the end of trading. The packages may then be sent to the bank. The packages may be identified as leaving the retailer by use of their identification, for example as they are loaded onto a security van, can be identified as they are received at the bank and compared to the list sent to the bank from the system. The bank may then confirm that the content of the packages corresponds to the content which they have been advised, although it is expected that in due course the banks will consider this unnecessary and will rely on the advised content of the packages from the retailer. In this way, the payments can be credited to the retailer's account much more quickly than is presently the case.

An example of the present invention will be described in accordance with the accompanying drawings, in which:

Figure 1 shows a schematic view of a system according to the present invention;

Figure 2 shows a schematic view of a secure unit used in the present invention;

Figure 3a shows a detailed view of an air channel;

Figure 3b shows a cross-section view through a fluid inlet;

5 Figure 4 shows an alternative air channel;

Figure 5 shows a bag sensor and fixing means;

Figure 6 shows an air supply system;

Figure 7 shows a bag;

Figure 8 shows an alternative bag;

10 Figure 9 shows a coin sorting and change giving system; and

Figure 10 shows an alternative air feed system.

A basic embodiment of the present invention is shown in Figure 1. In a conventional manner, the retail outlet includes a number of Electronic Point Of Sale tills 1, one of which is shown, that are linked by a network to a central
15 control unit. Each EPOS till includes conventional components, such as a till drawer 2 for storing coinage received and some notes for change, cheques, coupons and card payment slips, a bar code reader for reading details of the products sold from which the value of the products is determined and details
20 of the products sent to a stock management system for ordering new products, and a cheque printer. The system also includes an input for the till operator to indicate the type and value of payment received, for example to

indicate a cash, cheque or card payment. Where necessary, the system calculates the change due as the difference between the payment tendered and the overall value of the transaction. Change may then given to the customer from the till drawer 2.

- 5 Additionally, the till has a note handling system 3 that is linked by an interface to the EPOS system, and to a central control. As described in more detail below, the note handling system 3 comprises a secure unit into which notes tendered by a customer are inserted for validation and storage in a tamper evident package. The secure unit may be as disclosed in our co-pending
10 International Patent Application that claims priority from British Patent Application No. 9903317.7, the content of which is incorporated herein by reference.

- In use, when the till operator indicates that a cash payment is to be made, the operator enters the amount tendered, from which the change to be given is
15 calculated in the usual manner. In this case, any coins tendered are placed in the till drawer 2, and any change required taken from the float in the till drawer 2. Any notes received are fed into a validator 5 of the cash handling system 3 as shown best in Figure 2.

- The note handling unit 3 is formed as a lockable metal, typically steel case.
20 The front 15 of the case includes a chassis on which the components of the note handling unit 3 are mounted. The front 15 is provided on arms (not shown) including rollers to allow the front 15 and the chassis to be removed easily to allow access to the interior of the case. The construction of the case is such that it is secure, so that any attempt to breach the case is resisted due
25 to the strength of the case, and any attempt to breach the case is easily apparent. The unit also includes an alarm to alert any attempted, unauthorised opening. The alarm may include an audio alarm in the unit

- and/or a remote alarm, for example a signal may be sent to give a visual alert at the control unity. The case is locked by an electronic lock 14 that allows the case to be opened only after predetermined procedures have been completed as described below. The case includes an inlet slot 16 through which notes are inserted, and a note validator 5 that receives and validates the notes. The case includes a void which receives a plastics bag 7 or other package for the notes. Notes from the validator 5 are deposited in the package. When the unit is opened, the bag 7 and its contents are removable from the unit.
- 5
- 10 The validator 5 determines the authenticity and denomination of each note. The validator 5 may be a conventional validator 5 such as the IDS validator available from Global Payment Technologies, Inc. A note is inserted into the validator 5, and is driven, typically by a series of endless belt conveyors and/or rollers, past one or more note recognition devices. The validator
- 15 determines parameters of the note, for example its size, colour and magnetic properties. These determined parameters are compared with predetermined acceptable ranges of parameters for notes of different denominations. Based on this comparison, the note is either rejected if it cannot be determined to be a genuine note, or accepted and its value determined. Where a note is
- 20 rejected, the belts or rollers are driven in reverse to eject the note. The result of the determination of the validator is sent to the interface 4 or other control circuitry for appropriate processing or transmission to the central control unit of the system.
- 25 All accepted notes that pass through the validator 5 extend into an air channel 8 of an air chute 6. As best shown in Figure 3a, the air channel 8 comprises a generally oval channel 8 having a width of about 90 mm, a height of about 20 mm and a length of about 95 mm. The upper and lower faces 31,32 of the air channel 8 include an array of openings 30 which are spaced in rows

extending across the width of the channel 8 in which adjacent openings 30 are spaced by 20 mm, with adjacent rows being spaced by 10 mm with a 10 mm offset between openings 30 in adjacent rows. As shown in cross-section in Figure 3b, each opening 30 is formed by providing a 5 mm hole
5 through a dimple formed in the surface 31,32 of the channel 8, the hole being formed at an angle of about 45° to the channel 8. The resulting openings 30 are similar to those of a cheese grater. The air channel 8 is formed of metal sheet, such as aluminium, into which the holes 30 are punched or drilled and the dimples pressed using a punch and die. Alternatively, the air channel 8
10 may be moulded, for example from a plastics material. The dimple may be formed either into the channel 8 or out of the channel 8. In the case where the dimple is formed into the channel 8, the dimple is formed behind the hole 30 in the direction in which the note is to pass from the validator 5. In the case where the dimple is formed out of the channel 8, the dimple is formed in
15 front of the hole 30 in the direction in which the note is to pass from the validator 5. As shown in Figure 3b, the dimple causes air from outside the channel 8 to flow into the channel as a laminar air flow having a major component in the direction through the channel 8.

An alternative air channel 8' is shown in Figure 4. In this case, the openings
20 comprise elongate slots 30' provided in the upper and lower faces 31'32' of the air channel 8'. A guide 33, which may be pressed out of the channel 8' to form the elongate slots 30', directs air into the channel 8' as a laminar flow generally as described above. In the following, it will be understood that either air channel 8 or 8' may be used.

25 As shown in Figure 6, the channel 8 is provided within a duct 9, 45, both ends of which open to a fan or blower 10, for example a RL90-18/12NG DC radial blower available from PAPST which provides a flow rate of 40m³h⁻¹. The duct 9 extending from each of the blowers 10 has a width of about 25 mm

and a depth of about 70 mm giving a cross-sectional area of about 1750 mm². The ducts 9 from the blowers 10 are linked by a further duct 45 having a height of around 70 mm and a depth of around 70 mm. The air channel 8 is provided within this duct 45. The blowers 10 blow air into the ducts 9, 45, increasing the air pressure around the channel 8. The high pressure air, typically of around 2 atmospheres, passes through the openings 30 of the channel 8 into the channel 8. Due to the angle at which the openings 30 are formed, and the dimple, the turbulent air in the duct around the channel 8 is directed as a laminar flow into the channel 8 in the direction generally away from the validator 5. As the openings 30 are formed in both the upper and lower faces 31,32 of the channel 8, there will be a component of air passing vertically upwardly and downwardly to the centre of the channel 8. This acts to maintain the note hovering near the middle of the channel 8 so the note can pass freely through the channel 8 without catching on the surfaces of the channel 8. Typically, 10 to 20% of the air flows vertically. The horizontal component of the air, the remaining 80 to 90%, acts to entrain the note and draws this from the validator 5 into the bag 7.

An alternative example of an air feed system is shown in Figures 10a and 10b. Figure 10a shows the feed system in plan view, where items to be conveyed through a channel are conveyed from an inlet end on the right hand side towards the outlet on the left hand side. In the end view of Figure 10b, shown from the inlet end, items are conveyed away from the viewer. In the case of notes or similar items, these are generally horizontal, namely parallel to the top and bottom surfaces of the channel.

With the arrangement shown in Figure 10, the air is directed into the channel from either side at an angle of about 45°. This results in the two air flows from either side converging at a central point across the width of the channel, and close to the inlet end, with the combined air flowing longitudinally through the

channel, as shown best in the plan view of Figure 10a. As shown in Figure 10b, the air flows across the full height of the channel. This consistency throughout the height of the channel ensures that items conveyed through the channel are not bent.

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In operation, one or more sensors 50 are provided in the channel to detect the presence of an item to be conveyed, and the direction in which the item is travelling. When no item is detected, the velocity of air flowing through the channel is reduced to a nominal level, for example by decreasing the driving
10 voltage to an air fan supplying the air. This is advantageous both as it reduces the energy consumption of the system and the noise level of the system when nothing is to be conveyed, and as there is minimal air flow through the channel which may affect the insertion of an item to be conveyed. When an item is introduced into the inlet end of the channel, and this is
15 detected by the sensor 50, the velocity of the air supplied to the channel is increased. In this case, the resulting air flow through the channel will entrain the item, and convey this through the channel. When the sensor 50 detects that the item has been conveyed, or after a predetermined period after the presence of the note was detected, the air flow through the channel will again
20 be reduced.

25

On the outer surface of the air channel 8 at the end remote from the validator 5, there are provided two projections 41,42, the projection 42 nearest the end the channel 8 remote from the validator 5 having an inclined surface.

A sensor element 43 is provided between the two projections 41,42. This is shown in Figure 5. The projections 41,42 and sensor 43 are provided for location of a bag 7 on the air channel 8 and for ensuring the bag 7 is mounted correctly as described below.

- 5 As shown in Figure 7, the collection bag 7 comprises a generally cuboid bag 7 formed of polythene or other plastics material. In one example, the bag 7 has a width of about 120 mm, a length of about 250 mm and a height of about 300 mm. Such a bag 7 has a capacity of about 500 to 700 bank notes. An opening slit is provided across the upper front edge of the bag 7, and a
- 10 neck 62 having a length of about 50 mm is provided from this opening. An array of holes 61 is provided on the top face of the bag 7 towards the back, and on the rear of the bag 7 towards the top. Typically, around 100 holes 61 are provided on each of the upper and rear faces of the bag 7, each hole having a diameter of about 2 mm. The bag 7 is designed so that, once
- 15 inflated, it assumes its generally cuboid shape, although can be flat packed for storage. In another example, the bag 7 has a height of about 360 mm, a length of about 320 mm and a width of about 160 mm, and is provided with around 400 air outlet holes. The secure case also includes air vent holes through which air can enter the case to be driven by the blowers 10, and from
- 20 which air leaves the case after leaving the bag 7. The bag 7 includes a plastics rim 64 around the neck 62 of the bag 7 for fitting the bag 7 to an air channel 8 as described below. In an alternative arrangement, an internal removable ring may be provided to be secured to a bag 7 and fitted to the air channel 8.
- 25 An alternative bag design is shown in Figure 8. This bag is a cylindrical bag, again the an upper slit type opening with an associated neck 62' and air holes 61' provided in the upper rear of the bag 7.

Notes entrained in the air flow through the air channel 8 are transported by the air stream through the neck 62 of the bag 7 and into the bag 7. As the air flow enters the large volume in the bag 7, turbulence is introduced into the laminar air flow. This turbulence causes the entrained notes to be forced
5 towards the bottom of the bag 7. The turbulent air flow also acts to compress the notes already deposited in the bag 7 to maximise the number of notes which the bag 7 may contain. The air then leaves the bag 7 through the holes 61 in the top and rear of the bag 7. It is important that the velocity of the air flow into the bag 7 is not too great, since this will cause a reduction in the
10 pressure in the top part of the bag 7, and this will cause the notes in the bag 7 to lift.

The bag 7 includes a unique identification mark such as a bar code that is embedded in the plastics material from which it is formed. An identical bar code is embedded in a tear off strip 65 that is provided on the bag 7. This
15 strip may be removed from the bag 7 as this is fitted and used for identification.

In use, the bag 7 is provided within the secure case by placing the bag 7 within the void in the rear section of the case, and mounting the open neck 62 of the bag 7 over the end of the air channel 8 remote from the validator 5.
20 The neck 62 of the bag 7 is provided over the channel 8 to create an air tight seal. It is important to ensure that a bag 7 is in position and correctly fitted before items are introduced. As shown in Figure 5, the end of the air channel 8 remote from the validator 5 includes a pair of spaced projections 41,42. The projection 42 near the end of the channel 8 includes an inclined surface. In
25 between the projections there is provided a sensor 43. As described above, the neck 62 of the bag 7 is provided with a solid member 64 which is slid over the sloped surface of the projection 42 nearest the end of the channel 8, and locates between the two projections 41,42. In this position, the presence of

the solid member 64 is detected by the sensor 43 and it is determined that the bag 7 is correctly loaded. In the event that the sensor 43 fails to determine that the bag 7 is correctly loaded, the secure unit is disabled to prevent notes being inserted, since otherwise any notes inserted will not be stored in a tamper evident package. Further, an optical sensor may be provided to confirm a bag 7 is provided within the case, and that the sensor 43 has not been unlawfully disabled. A switch is then actuated, causing the fans to be activated and air to flow into the air channel 8 and into the bag 7. This air inflates the bag 7, causing the bag 7 to assume its cuboid arrangement.

The dimensions of the bag 7 are slightly greater than the space within the case of the secure unit in which the bag 7 is provided, thereby ensuring that the bag 7 assumes the shape of the space in the case. To further ensure the bag 7 is correctly loaded, the air flow or fan driving the air can be monitored. In the event that a bag 7 is not fitted correctly, or the bag 7 is damaged, for example if this is torn, the air flow will deviate from an expected level, and the error can be detected and the unit disabled. Detection of the bag in this way may be achieved by determination of the drive current of the air fan.

When the bag 7 is loaded, the identity of the bag 7 is recorded in the central unit so the payments deposited in the bag 7 may be identified. To achieve this, a bar code reader associated with the money handling unit reads the bar code embedded in the bag 7, or the bar code on the tear-off strip. In one example, a hand-held bar code reader is provided at the station, and the information is read from the embedded bar code by the reader and this information is transmitted to the central unit for logging. In another example, the validator 5 doubles as a bar code reader. In this case, the tear-off strip from the bag 7 is read through the validator 5 which reads the bar code to identify the bag 7 and this information is transmitted to the central unit. In a still further example, the bag identification may be manually input to the

central unit. In any case, it is arranged that the validator 5 will not accept notes until the bag 7 has been identified to the control unit.

In an alternative arrangement, a small memory chip or processor is attached to the bag 7. The memory chip includes a unique identification. The memory
5 chip can be read to identify the bag 7. The memory chip can also be written to, and so can store a copy of the information sent to the control unit as described below. In this way, the bag 7 itself has a store of its contents.

As shown in Figure 2, a heat seal unit is provided to seal the open neck 62 of the bag 7 downstream of the air channel 8. The heat seal unit is a
10 conventional unit, comprising two bars 11,12 which are movable with respect to each other to clamp the neck 62 of the bag 7. Both of the bars 11,12 are coated with a non-stick material, for example Teflon (Trade Mark) to ensure that the molten plastics material of the bag 7 does not adhere to the bars 11,12. One of the bars 12 includes a heating element which is heated by a
15 current to melt the plastics material and weld the two sides of the neck 62 of the bag 7 together.

One of the bars 11 is pivotally mounted to allow this to be moved out of the way when a bag 7 is to be mounted on the air channel 8. One of the bars 12 is actuated by a motor or solenoid 13 to drive the bars 11,12 with respect to
20 each other to clamp the neck 62 of the bag 7. This bar 12 is moved between a rest position about 50 mm from the neck 62 of the bag 7 and a seal position by the motor or solenoid 13. A microswitch (not shown) is provided to detect when the bars 11,12 are clamping the neck 62 of the bag 7, and this causes a current to be applied to the heater element for a predetermined period,
25 typically 3 seconds, to weld the neck 62 of the bag 7 closed.

The heat sealing unit embeds a unique identification in the seal. This is achieved, for example, by the profile of the sealing bars. As it is difficult to

replicate the unique identification, it is difficult for the seal to be broken and a new seal formed without this being apparent.

The secure case is locked by an electronic lock 14, including a solenoid or other magnetic element. When the key is actuated to unlock the case, before
5 the lock is released, the heat seal unit is actuated to seal the bag 7. Only then is the case opened to allow access to the bag 7. In this way, the bag 7 is sealed to form a tamper evident package before it can be accessed, giving a high degree of security.

A dye pack may also be provided, for example in or before the feed conveyor.
10 The dye pack is arranged so that, in the event of any tampering with the secure unit, the dye pack explodes so the contents of the secure unit are dyed, making them worthless. This is a further deterrent.

As will be described below, under certain circumstances, in particular where there is a note in the neck 62 of the bag 7 in the region where the bag 7 is to
15 be sealed, it is desirable not to heat seal the bag 7. In this case, the electronic lock 14 will not allow the case to open. In this case, it is necessary for the case to be opened by an over-ride lock which can be actuated only be a person with a high security level, for example a bank employee or a senior supervisor. The over-ride lock may be in the form of a magnetic touch key, for
20 example a Dallas DS19xx Touch Key Memory, or a digital membrane keypad, requiring the entry of a correct code to gain access to the unit. It is possible that different levels of entry code are provided for operators of different seniority. Such a device provides an over-ride lock that is within the casing, and which is not visible externally. Accordingly, there is no external indication
25 of its presence and location. The lock is opened by a high security, unique passive key which interacts with the specific lock to over-ride the normal

electronic lock 14 to give access to the secure unit and the unsealed bag 7 contained therein.

As previously described, the end of the air channel 8 remote from the validator 5 includes a sensor to detect the presence and direction of movement on a note within the air channel 8. The sensor may comprise a number of proximity sensors, for example a number of light emitter and detector pairs, arranged in the direction of travel of the note through the air channel 8. The presence of a note can be determined when any of the light detectors does not receive light from its associated light emitter due to a note blocking the light path between them. The direction of movement of a note can be determined by the order in which the light is blocked or not blocked for the different sensors. For example, where the light is blocked first between the emitter-detector pair nearest the validator 5 and then between the pair nearest the end of the air channel 8 remote from the validator 5, it can be determined that the note is moving from the validator 5 towards the bag 7. When the light is initially blocked between all pairs, and then light is received first by the detector nearest the end of the air channel 8 remote from the validator 5 and then by the detector nearest the validator 5, it is determined that the note is moving in the direction away from the bag 7 and towards the validator 5. This may occur when a note is rejected by the validator 5, or when there is an attempt to remove notes from the secure unit.

The provision of a proximity sensor in the air channel 8 allows the system to confirm that there are no notes in the neck 62 of the bag 7 when the case is unlocked to prevent the bag 7 sealer from sealing the neck 62 of the bag 7, and sealing the note in place. The proximity sensor can also confirm that the notes leaving the validator 5 are received within the bag 7, and can confirm that no notes are jammed within the air channel 8. The system ideally records the receipt of a note within the bag 7 only when it is determined by the sensor

that the note has passed through the air channel 8 and into the bag 7, rather than when the note is determined by the validator 5. The reason for this is that it is possible for a note to pass through the validator 5 and remain in the air channel 8. When a subsequent note is inserted into the validator 5, the
5 note may be rejected for a number of reasons. However, the leading edge of the note may contact the note stuck within the air channel 8, and when the note is rejected, this may pull the jammed note from the air channel 8. Therefore, if the content of the bag 7 is determined purely on the output from the validator 5, it will be determined by the system that the note jammed in the
10 air channel 8 and rejected with a following note is in the bag 7, where as, in fact, the note will not be in the bag 7. By only determining that the note has entered the bag 7 after the note has been determined to have left the air channel 8, the notes in the bag 7 are determined correctly.

- 15 A note may be rejected by the validator 5 if the parameters of the note do not fall within the predetermined parameters of an acceptable note. This rejection is a function of the validator 5.

An interface 4 is associated with the cash handling system 3 for transmitting information to a central control, for example the identification of the bag 7, the
20 number of notes and their denomination in the bag 7 and the time at which the notes are deposited in the bag 7.

In this way, the central control receives and can record a list associated with each identifiable tamper evident package of the contents of that store, broken down for example by the quantity of notes of different denomination.
25 Therefore, when the store or package is sealed and removed from the unit, the list of contents is associated with the package allowing the package to be treated as a single item of known composition and value. Therefore, there is

no need for the package to be opened and the contents counted and balanced. This reduces significantly the amount of time spent in handling the notes and, by reducing the handling, increases the level of security.

The interface 4 also receives information from the EPOS system. For example, when the till operator indicates that a payment is to be made by cash, and the amount exceeds a predetermined level corresponding to the smallest denomination of note of a currency, an indication can be sent to the interface 4 to alert the cash handling system 3 that a note can be expected. In the event that no note is received and validated, the interface 4 can alert the central controller. There are a number of reasons why a note may not have been received - the customer may have tendered only coins, there may be a breach in procedure, for example the till operator may have put the money directly in the till or may have entered the payment type as cash in error, or there may be a breach of security, for example the money may not have been received by the till operator, or the operator has taken the money. In any case, the time at which this inconsistency occurred will be identified, and steps can be taken to rectify this, for example by training. This is assisted if the till operator is required to log on when they start operating a till. This sign on can be communicated either over the normal EPOS system or via the interface 4 to the central control, and therefore the operator responsible for the inconsistency can be identified.

The central control unit is also able to control aspects of the operation of the cash handling system 3, for example to cause notes to be returned to top up the till drawer 2 rather than being deposited in the tamper evident package 7.

The system knows how much cash is added and removed from the till since it knows the value of each transaction, the amount of money received and the change due from the EPOS system. The system knows therefore how much

money is in the till at any one time. The system is therefore able to determine when the float in the till falls more than a predetermined level below the required float. In this case, the system is able to determine that notes fed into the validator 5 will not be deposited in the bag 7, but will be returned to the till operator for topping up the till. This is indicated to the central control to ensure that the list of items in the tamper evident package 7 corresponds to that actually deposited, and does not include items which are returned to the till.

The system also includes a scrolling liquid crystal display screen which gives messages to the till operator. For example, the display screen can indicate the denomination of a note determined by the validator 5. Therefore, if a customer presents a note of one denomination and later claims to have tendered a note of a different denomination, the actual denomination of the note determined by the validator 5 will be displayed to resolve the matter. If a note does not fall within the allowable parameters for notes of acceptable types, a reject message can be displayed so the till operator knows that the note is not acceptable and that different payment is required. Similarly, if the note is to be returned to the operator to top up the till float, an instruction message may be presented on the display. The system messages may also be printed on a dedicated local printer so there is a hard copy of all messages produced by the system.

In a preferred example of the invention, the system allows communication from the till point to the control unit. A keypad is provided at the point of sale to allow the till operator to request change. In this case, when the till operator requires additional coinage for change, the operator merely keys in the request which is transmitted to the control unit which can indicate the request. The change is then provided to the till, for example by being manually taken to the till point.

In a further example of the present invention, instead of the operator manually entering the amount of cash tendered, the value of the notes tendered may be determined by the note validator 5, and a similar validation system may be used for the coinage, thereby determining automatically the amount tendered and the change due.

The system may also be provided to automatically dispense the change required. As shown in Figure 8, the coins tendered are placed in a hopper 80, and the authenticity and denomination of each coin is determined in a known manner by a suitable coin sorter 81 such as the Coin Counters Model 1321 or 1361 available from Cummins Alison Ltd. From this, the value of the coins tendered is determined. The coins are then sorted by denomination and pass through an outlet 82 of the sorter 81 into separate hoppers or stacks 83 for coins of different denominations. The coins are held in the hoppers or stacks 83 by gates 84. The system determines the change as the difference between the amount tendered and the value of the transaction, and determines how to provide the change from the coinage available in a known manner. The appropriate coinage is then discharged from the hoppers 83 by opening the appropriate gates 84 to discharge the coins along a discharge chute 85 to provide the change. The system may also be arranged to discharge notes from a note float, or may instruct the till operator to manually supply certain notes from the till float.

Although the main benefit of the system is gained from the cash handling system 3, since cash is the easiest form of payment to be stolen and the hardest to identify, count and balance, similar secure units as that described for notes may be used for other forms of payment, for example for cheques and credit cards. In this case, the note validator 5 is replaced by another form of identification means which is able to determine features of the payment.

- When a payment is to be made by cheque, the till operator indicates this to the EPOS system. In many stores, a cheque printer is provided as part of the EPOS system to print details on customers' cheques, for example the retailer's account name, the amount of the transaction and the date. In addition, the system of the present invention is able to print a bar code or other readable identification on the reverse of the cheque, including encoded information relating to the transaction number and amount, and other information such as the customer's details, bank sort code etc. After the customer has signed the cheque, this is fed into the secure unit for cheques.
- The reader provided within the secure unit reads the bar code printed on the back of the cheque to obtain the information contained within the bar code to identify the cheque, the value and the transaction to which the cheque relates. The cheque is then deposited in a bag or container 7 through an air channel 8 in the same way as notes as described above. Alternatively the cheque may be transported by rollers or endless belt conveyors. The information relating to the deposited cheque is transmitted over the network to the central unit. When the secure case is opened, the bag 7 is sealed in the manner described with respect to the cash secure box. Therefore, as with the cash transactions, at the end of trading a tamper evident sealed bag 7 is produced containing the cheques received, and the full details of the cheques contained in the bag 7 are held in the central unit and the list can be associated with the respective package. Therefore, there is no need to count and balance the cheques with the records from the EPOS system, and the package can be sent to the bank in the same way as the cash packages.
- A similar system can be used for credit and debit card payments.

Alternatively, a separate unit may be provided for cheques in a cash room or other central location. In this case, cheques are processed in the usual manner by the sales assistant, and collected in the till drawer. The cheques

are later removed from the till drawer. The cheques are then fed into a secure unit which identifies the cheques, for example using an optical character reader or a bar code reader to read a specially printed bar code on the cheque. The cheque is then fed to a tamper evident package as described
5 above, which is sealed before it can be removed. In this way, a tamper evident package containing identified cheques is produced. It will be appreciated that this arrangement can be used for other forms of payment such as credit and debit card payments and coupons. It will also be appreciated that this system may be used alone, namely without the individual
10 tamper evident packages provided at each sale point associated with a transaction entry system.

It will be appreciated that the cash, cheque and card payment secure units can be formed as a single unit. In this case, the note validator 5 may also function as a bar code reader, as is the case with the Global Payment
15 Technologies, Inc. IDS validator 5. The payments received may then all be deposited in a single bag 7, or may be sorted automatically by type and deposited in one of a number of bags 7 provided in the unit, for example one each for cash, cheques and card vouchers. Alternatively, there may be a number of inlets to the secure unit, each inlet having an appropriate identifier
20 or validator 5. For example, the unit may have a cash inlet for notes with an associated note validator 5, a cheque inlet with an associated bar code reader for reading a bar code printed on the rear of the cheque, and a card voucher inlet with an associated optical character reader for reading the details of the transaction from the voucher, all with associated air channels 8, bags 7 and
25 heat seal units.

With the system of the present invention, many payments made by customers are identified and validated as they are deposited in a secure case. The payments can only be removed from the case in an identifiable, tamper

evident package. The identity of the items deposited in the secure, tamper evident package, including their value, are known and stored in a central control, together with an identification of the unit in which the items are stored. When the secure cases are opened, the payments contained within the units
5 are sealed in a tamper evident, identifiable package. The content of the package can be determined from the list of contents. Any attempt to violate the package, for example to change the contents, will be apparent. Therefore, the content can reliably be considered to correspond to the list of contents unless there is a visible indication that an attempt has been made to
10 violate the package. Therefore, the package can be handled as a single unit of known value. This reduces significantly the amount of time required to balance the tills at the end of trading, since it is no longer necessary to count individually all of the payments received and compare this to the expected totals from the EPOS system. Further, details of the contents of the packages
15 may be sent to the bank or other payment processor immediately at the end of trading. The packages are identifiable, and therefore it can be confirmed that the particular packages leave the store, for example that they are loaded onto a security van for transportation to the bank. It can also be confirmed that the particular packages are received by the bank. The bank are therefore
20 able to confirm the receipt and content of the packages quickly, and therefore are able to credit the store's account quickly.

Where money is carried to and from a security van, it is usual for these to be carried in a secure box that includes a dye or smoke system which is activated if the box is stolen, for example where the box is moved more than a
25 predetermined distance from the security van. The holes in the bags 7 also allow the dye or smoke to pass through the bag 7 and cover the contents as an anti-theft measure.

It will be appreciated that many of the controls and determinations which are referred to above as being made by the control unit may be made locally at the point of sale and vice versa.

CLAIMS

1. A transaction management system comprises a station at a sale point and a control unit, the station comprising:

5 a means for entering transaction information, including the value of the transaction and the method of payment;

a secure unit (3) for receiving and identifying payments received, and storing the payments received in a tamper evident package (7) in an identifiable manner including the type and value of the payments; and

10 a means for communicating the transaction information and identification of the payments stored in the tamper evident package (7) to the control unit.

2. A transaction management system according to claim 1, comprising a station at each of a plurality of sale points that are connected to a single control unit.

15 3. A transaction management system according to claim 2, in which each of the individual stations is connected to the control unit over a network.

4. A transaction management system according to any one of the preceding claims, in which the control unit records the time of the transaction.

20 5. A transaction management system according to any one of the preceding claims, in which each till operator is required to log in when they are to carry out transactions at a station.

6. A transaction management system according to any one of the preceding claims, in which the secure unit (3) is provided for handling cash payments, and includes a note validator (5) for receiving a note and determining the authenticity and value of the note.
- 5 7. A transaction management system according to any one of the preceding claims, in which, where it is indicated that a payment is to be made by cash, and the validator (5) does not receive a note to validate, this absence of a note is transmitted to the control unit.
- 10 8. A transaction management system according to any one of the preceding claims, in which the secure unit is provided with a recognition or identification system that identifies the value printed on the cheque, card slip, coupon or voucher before the cheque, card slip, coupon or voucher is passed into the secure unit.
- 15 9. A transaction management system according to claim 8, in which the system includes a printer for printing an identification mark on each cheque, credit or debit card slip, coupon or voucher tendered as payment and the recognition or identification system reads the identification mark printed on the cheque or voucher to identify the cheque or voucher.
- 20 10. A transaction management system according to any one of the preceding claims, in which each station is provided with a number of different secure units (3) for transactions of different types.
11. A transaction management system according to any one of claims 1 to 9, in which each station has one or more secure units (3) which are able to handle a number of different types of payment.

12. A transaction management system according to any one of the preceding claims, in which the tamper evident package (7) is a bag or other container.

5 13. A transaction management system according to any one of the preceding claims, in which the tamper evident package (7) is sealed before it can be removed from the secure unit (3).

14. A transaction management system according to claim 13, in which the bag or container (7) is security sealed before it can be removed from the secure unit (3).

10 15. A transaction management system according to any one of the preceding claims, in which the tamper evident package (7) includes individual identification.

15 16. A transaction management system according to claim 15, in which the individual identification is in the form of a memory chip attached to the tamper evident package (7).

17. A transaction management system according to any one of the preceding claims, in which the payment is transported from into the tamper evident package (7) by a gas powered delivery system (8).

20 18. A transaction management system according to Claim 17, in which the gas powered delivery system comprises a channel (8) through which items are to be conveyed and a pair of gas inlets provided on opposite sides of the channel (8) inclined at an angle to that in which the items are to be conveyed, and through which gas from outside the channel (8) is jetted to produce a gas flow through the channel which entrains an item to convey this through the
25 channel.

19. A transaction management system according to claim 17 or Claim 18, in which the delivery system comprises a channel (8) provided adjacent the outlet of the identifier or validator (5), and which includes an array of angled fluid flow openings provided on its upper and lower face, the exterior of the
5 channel being pressurised with gas which jets through the angled openings into the channel to give a generally vertical stream of fluid extending upwardly from the lower face and downwardly from the upper face, and jets passing longitudinally through the channel to entrain the payment.

20. A transaction management system according to claim 19, in which the
10 openings are in the form of louvered slots extending substantially across the width of the channel.

21. A transaction management system according to any one of the preceding claims, in which a display, for example a liquid crystal display unit, is provided at each sale point on which details of the verification or
15 identification may be displayed.

22. A transaction management system according to any one of the preceding claims, in which a means is provided for communication between the or each station and the control unit.

23. A transaction management system according to any one of the
20 preceding claims, in which the system is controlled to maintain the level of the float at the or each station.

24. A transaction management system according to claim 23, in which the money remaining in the till is determined from the value of the cash transactions and the payments received, and when the determined level of
25 cash in the till falls below a predetermined level in comparison to the initial float, money is returned to the till to make up the deficit.

25. A transaction management system according to any one of the preceding claims, in which each sale point includes a coinage dispense system for dispensing change.

5 26. A transaction management system according to any one of the preceding claims, in which the control unit collates details of all transactions, including for example the number and time of the transaction, the value of the transaction, the method of payment and the details of the location of the payment, for example in the till or in an identifiable secure area to determine the total value and type of payment in any secure area from any point of sale.

1/6

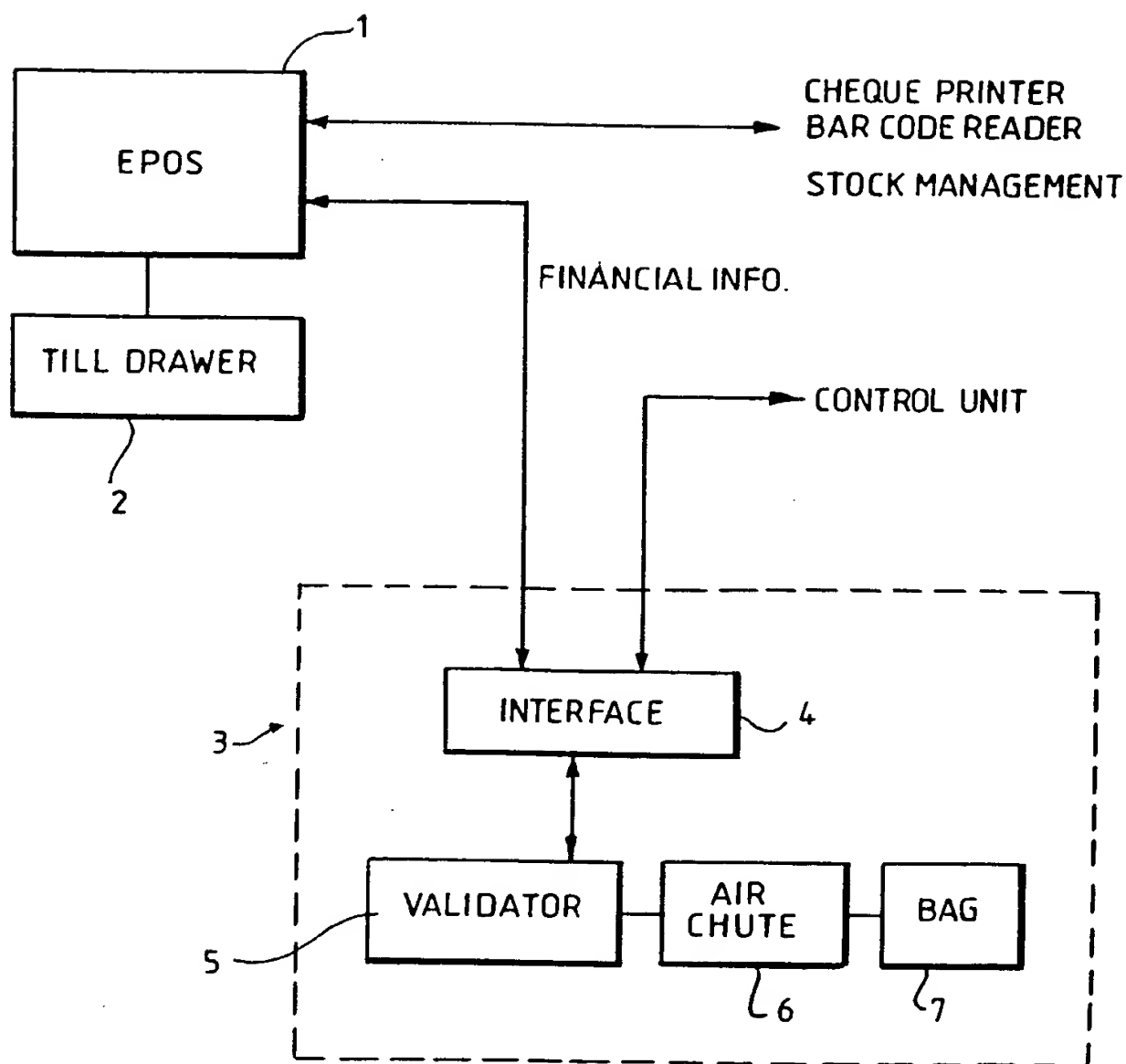


Fig.1.

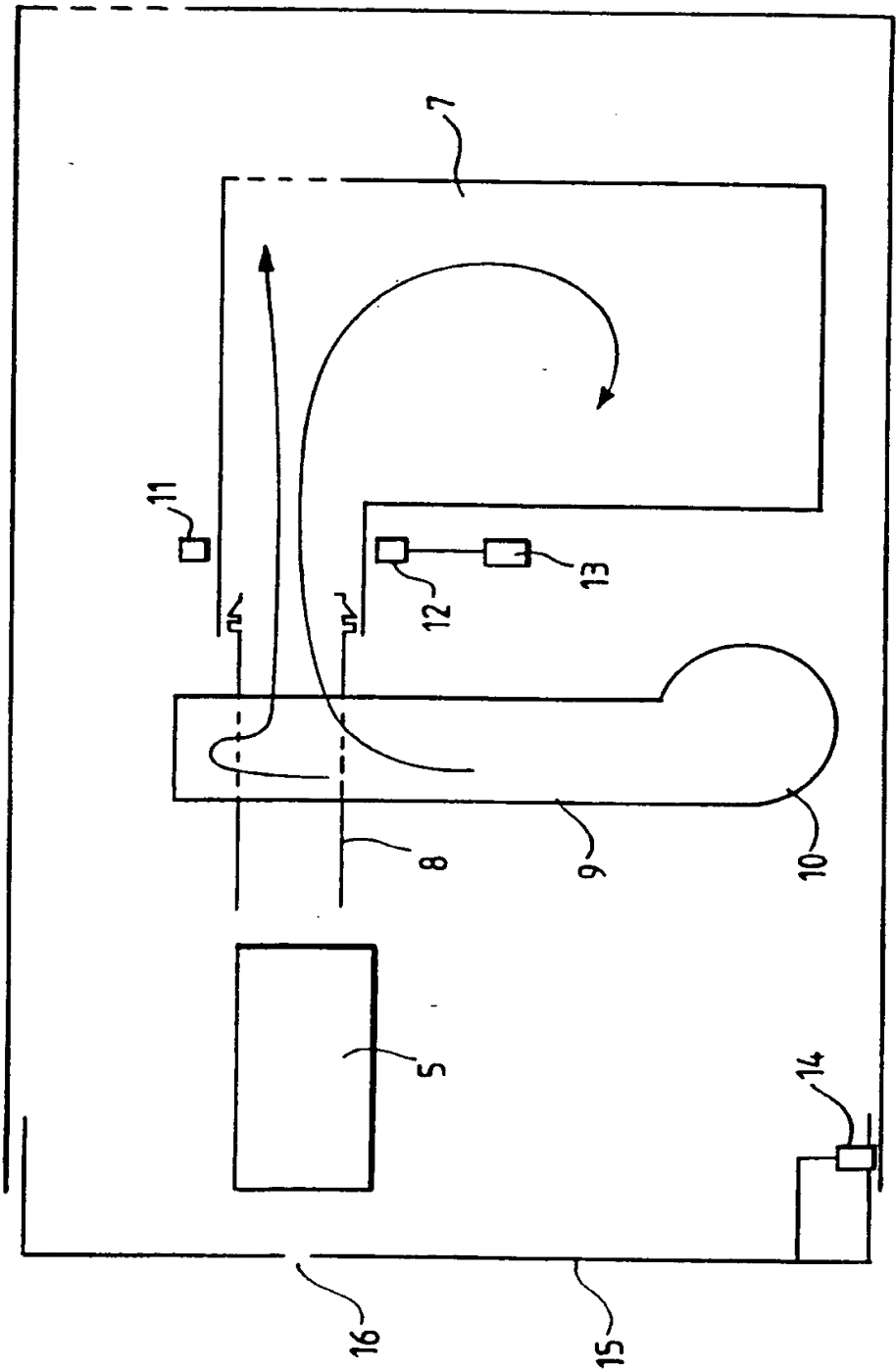


Fig.2.

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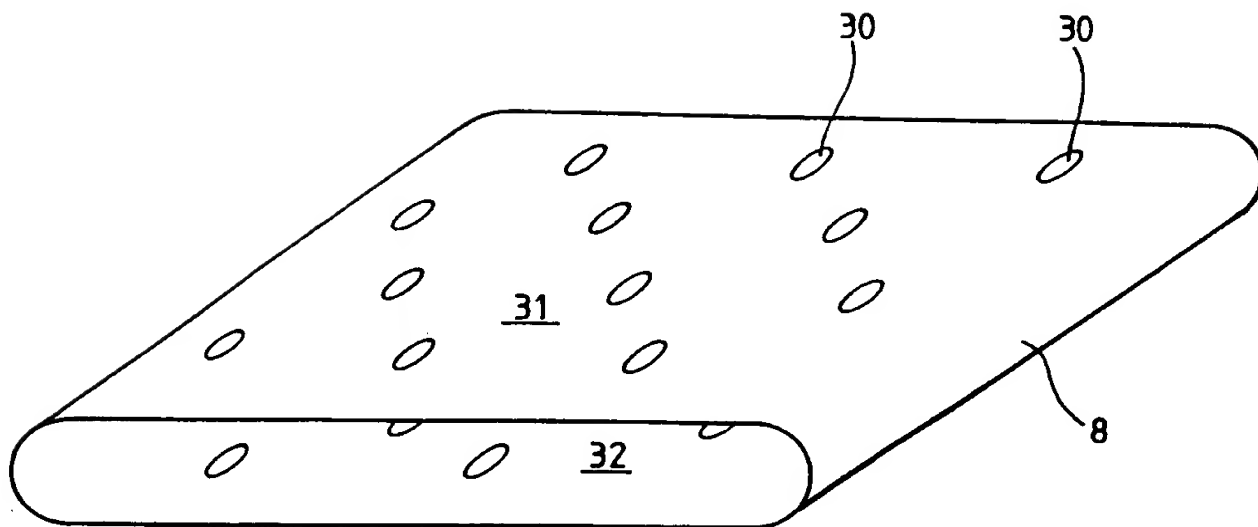


Fig. 3a.

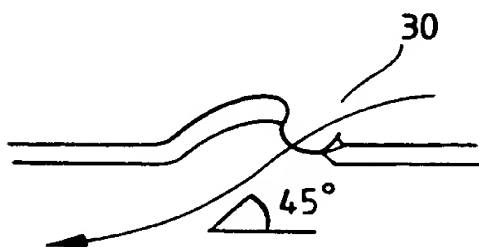


Fig. 3b.

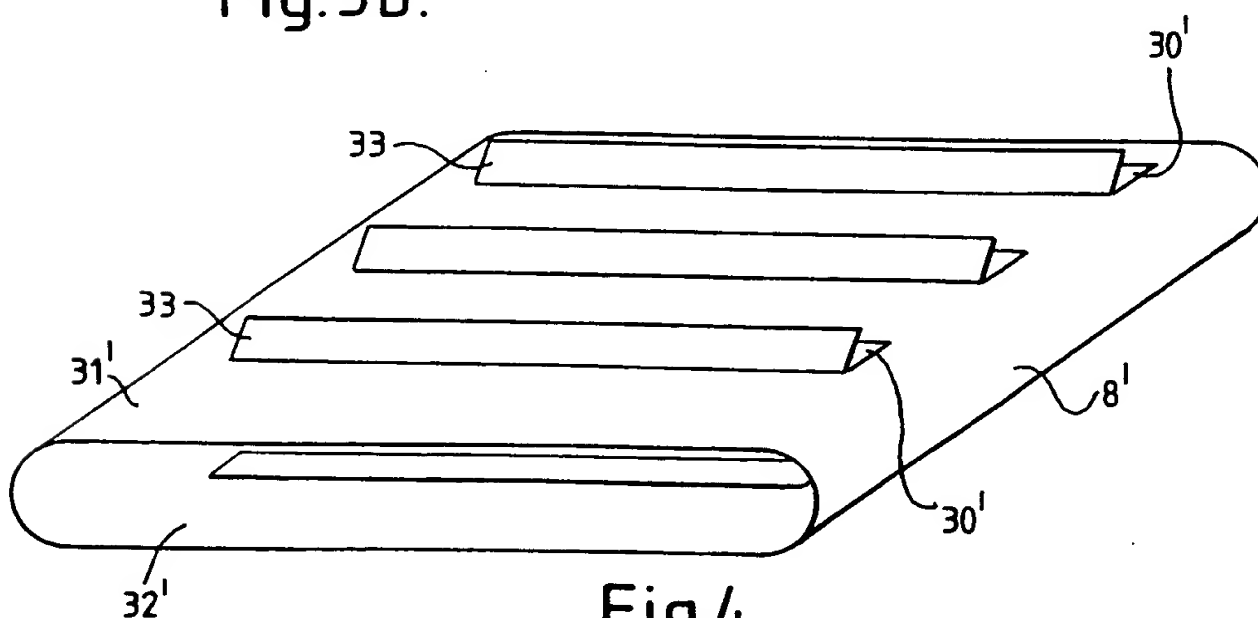


Fig. 4.

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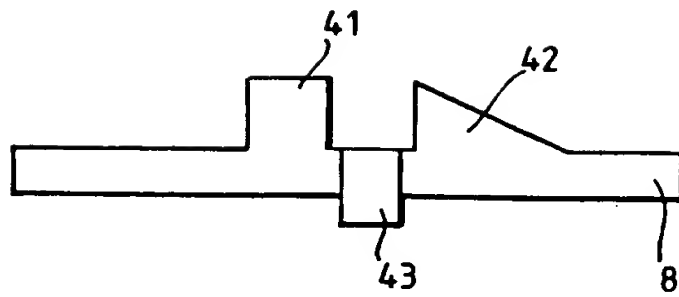


Fig. 5.

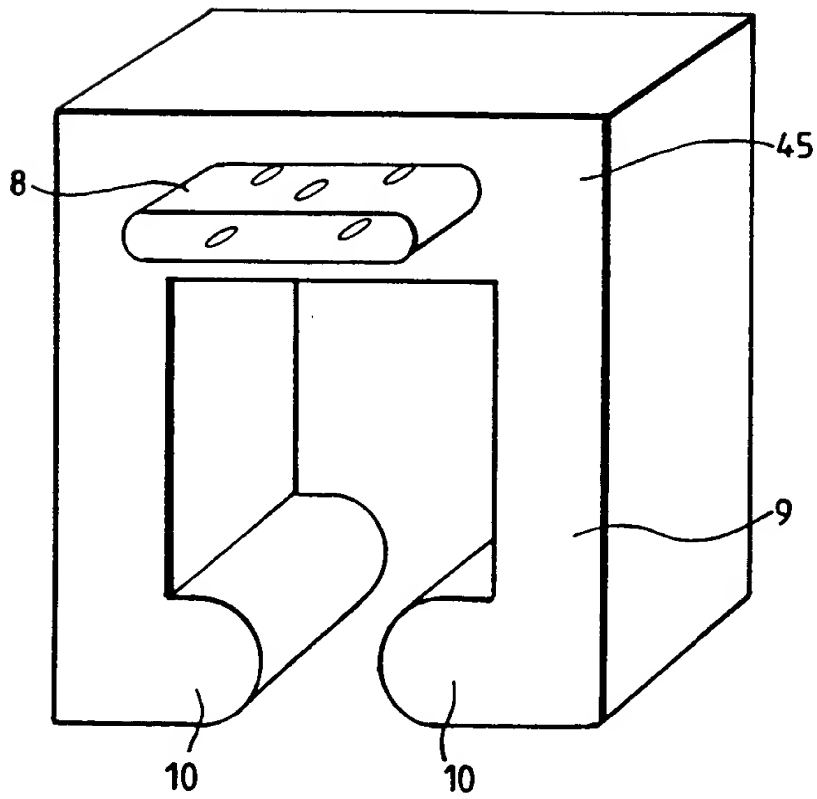


Fig. 6.

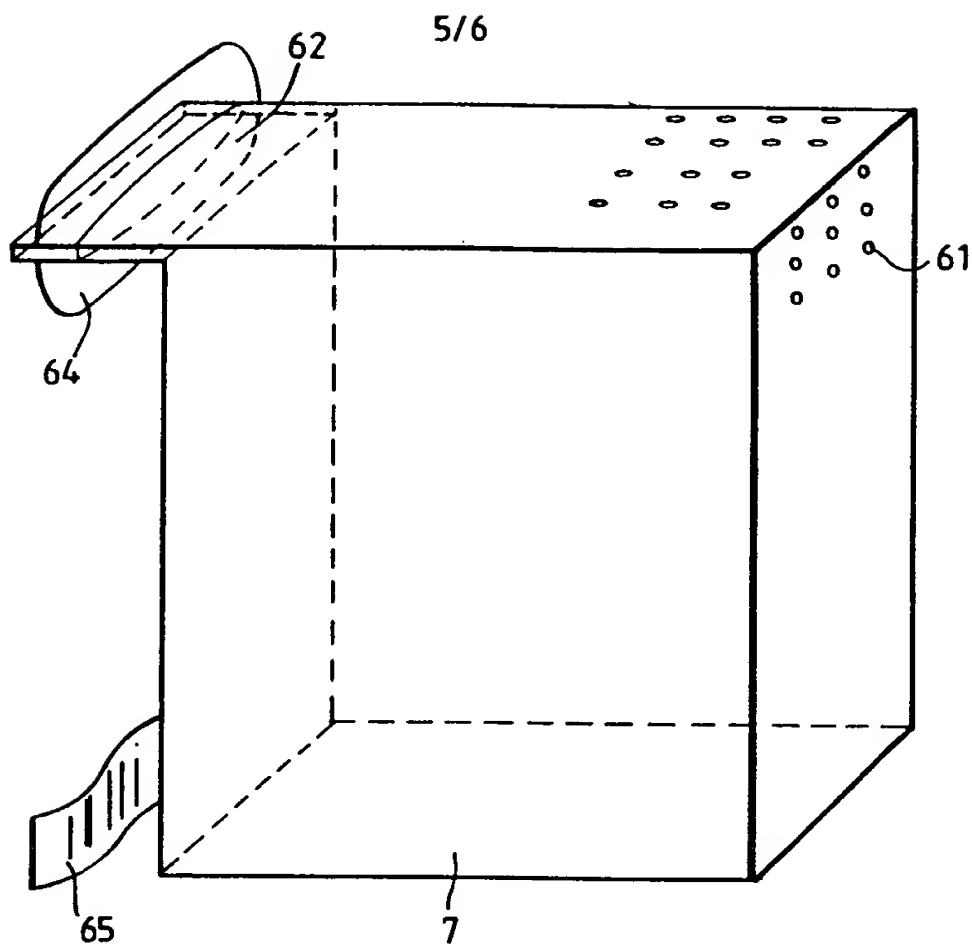


Fig.7.

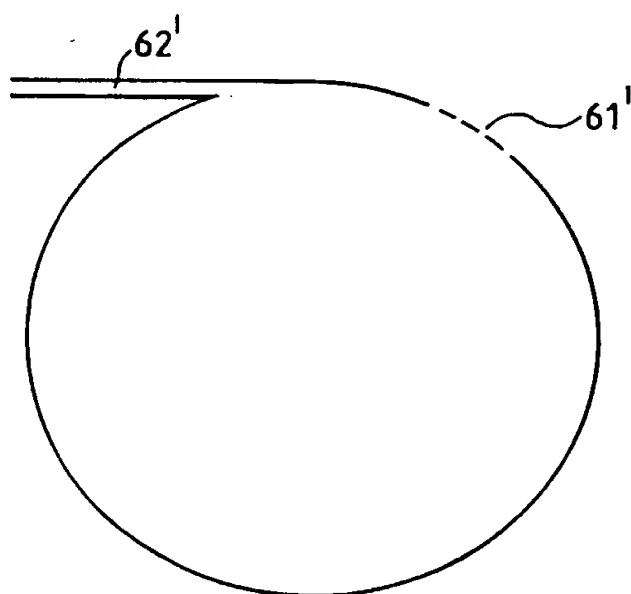


Fig.8.

6 / 6

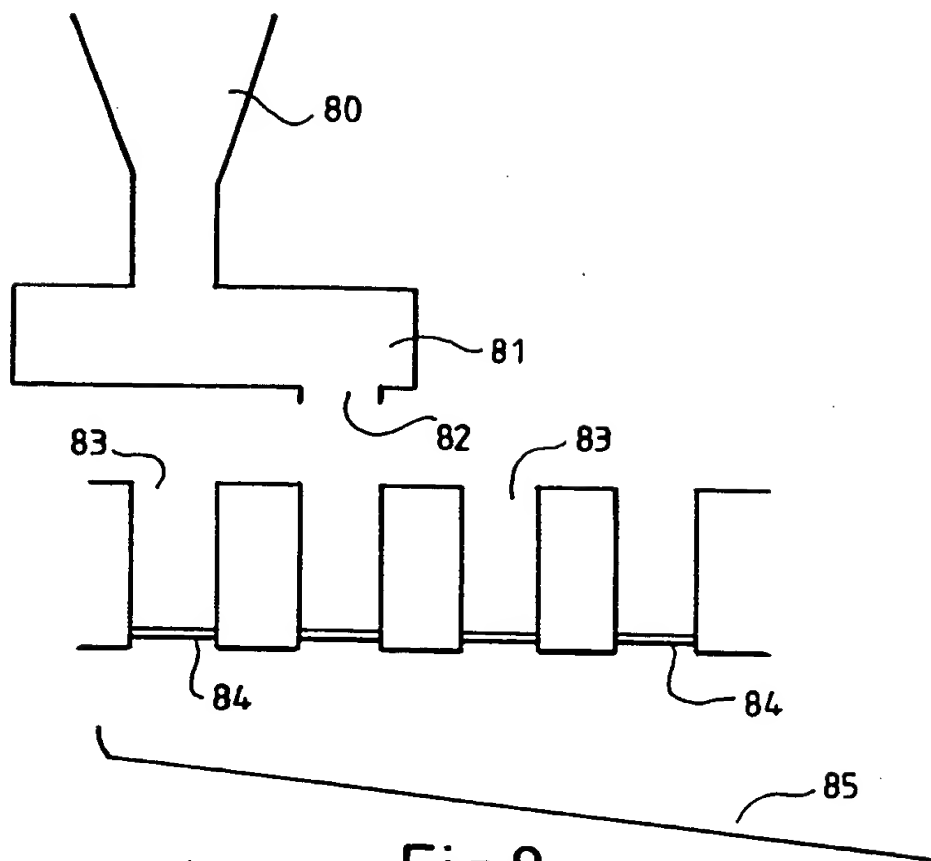


Fig.9.

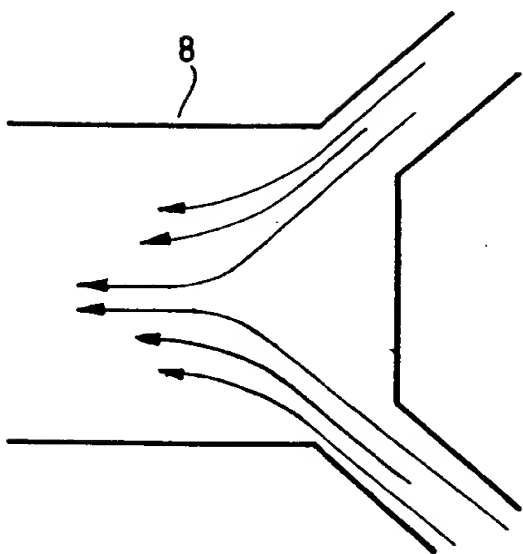


Fig.10a.

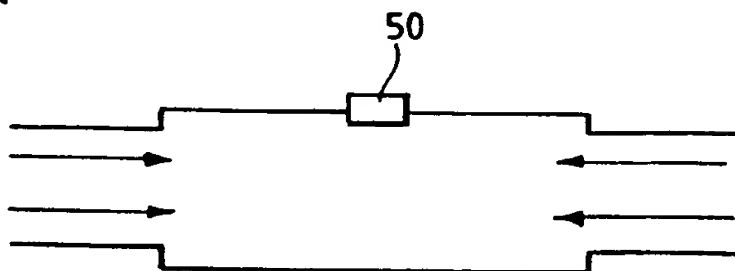


Fig.10b.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/00455

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G07G1/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G07G G07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 246 656 A (TIMETILL SECURITY LTD) 5 February 1992 (1992-02-05) abstract page 1 page 7, paragraph 4 -page 8, paragraph 2; figures page 18, paragraph 2 -page 20, paragraph 2	1,12-16
Y		2-9,17, 21,22, 25,26
Y	EP 0 555 531 A (LANDIS & GYR BUSINESS SUPPORT) 18 August 1993 (1993-08-18)	2,3,6, 21,22, 25,26
A	the whole document	23,24
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

27 April 2000

Date of mailing of the international search report

16/05/2000

Name and mailing address of the ISA

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Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Teutloff, H

PCT/GB 00/00455

Form PCT/ISA/210 (continuation of second sheet) (July 1982)

INTERNATIONAL SEARCH REPORT

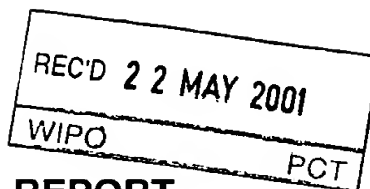
Information on patent family members

Inter Application No

PCT/GB 00/00455

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2246656	A	05-02-1992	AU 8312491 A WO 9202903 A	02-03-1992 20-02-1992
EP 0555531	A	18-08-1993	JP 5334331 A NO 930441 A	17-12-1993 11-08-1993
WO 9425940	A	10-11-1994	AU 6575294 A GB 2283354 A, B US 5615759 A	21-11-1994 03-05-1995 01-04-1997
US 4570223	A	11-02-1986	JP 1237837 C JP 56057163 A JP 59013787 B JP 1224800 C JP 56057164 A JP 59000859 B DE 3038399 A	31-10-1984 19-05-1981 31-03-1984 31-08-1984 19-05-1981 09-01-1984 30-04-1981
US 4070564	A	24-01-1978	NONE	
GB 2081185	A	17-02-1982	DE 3130490 A FR 2493230 A JP 57057666 A	12-08-1982 07-05-1982 06-04-1982
EP 0343013	A	23-11-1989	AT 79824 T AU 611038 B AU 3681389 A CA 1314856 A WO 8911430 A GR 3006228 T JP 3504231 T NZ 229222 A US 5092714 A ZA 8903770 A	15-09-1992 30-05-1991 12-12-1989 23-03-1993 30-11-1989 21-06-1993 19-09-1991 26-07-1990 03-03-1992 28-12-1990
US 4438704	A	27-03-1984	GB 2079832 A CA 1167324 A DE 3176233 D EP 0055768 A JP 2059515 B JP 57501050 T WO 8200285 A	27-01-1982 15-05-1984 09-07-1987 14-07-1982 12-12-1990 10-06-1982 04-02-1982

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference ///	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/00455	International filing date (day/month/year) 11/02/2000	Priority date (day/month/year) 12/02/1999
International Patent Classification (IPC) or national classification and IPC G07G1/12		
Applicant REDDING, James		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 12/09/2000	Date of completion of this report 18.05.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Hascher, T Telephone No. +49 89 2399 2690 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00455

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-34 as originally filed

Claims, No.:

1-26 as originally filed

Drawings, sheets:

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00455

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2-5,7-11,17-20,22-26
	No:	Claims	1,6,12-16,21
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-26
Industrial applicability (IA)	Yes:	Claims	1-26
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Reference is made to the following documents:

- D1: GB-A-2 246 656 (TIMETILL SECURITY LTD) 5 February 1992 (1992-02-05)
- D2: EP-A-0 555 531 (LANDIS & GYR BUSINESS SUPPORT) 18 August 1993 (1993-08-18)
- D3: WO 94 25940 A (CADBURY MATTHEW J) 10 November 1994 (1994-11-10)
- D4: US-A-4 570 223 (YOSHIMOTO TAKETOSHI) 11 February 1986 (1986-02-11)
- D5: GB-A-2 081 185 (PA MANAGEMENT CONSULT) 17 February 1982 (1982-02-17)
- D6: EP-A-0 343 013 (TRIPMATIC LTD) 23 November 1989 (1989-11-23)

Reasoned statement under Article 35(2) PCT with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The present application does not satisfy the criterion set forth in Article 33(2) PCT because the subject-matter of Claims 1, 6, 12-16 and 21 is not new in respect of prior art as defined in the regulations (Rule 64(1)-(3) PCT).

Document D1 discloses (see figures 1, 2 and the description page 1, page 7, paragraph 4 - page 8, paragraph 2, page 14, paragraph 3 - page 16, paragraph 1, page 18, paragraph 2 - page 20, paragraph 2) a transaction management system comprising a station 16 at a sale point and a control unit 131, the station comprising:

means 60 for entering transaction information, including the value of the transaction and the method of payment;

a secure unit 10 for receiving and identifying payments received, and storing the payments received in a tamper evident package in an identifiable manner including the type and value of the payments, said secure unit being provided for handling cash payments, and including a note validator for receiving a note and determining the authenticity of the note; and

a means for communicating the transaction information and identification of the payments stored in the tamper evident package to the control unit 131.

The tamper evident package is a container, which is security sealed before it can be removed from the secure unit.

The tamper evident package includes individual identification in the form of a memory chip attached to the tamper evident package.

A display 64, for example a LCD display is provided at each sale point on which details of the verification or identification may be displayed.

The cassette is adapted to receive bank notes, cheques, or credit card vouchers.

2. Other relevant prior art documents:

- 2.1. Document D2 discloses (see the abstract, figure 1, and the description column 7, lines 3-31) a transaction management system comprising a station 1, 2 at each of a plurality of sale points that are connected over a network to a single control unit 40. A means is provided for communication between each station and the control unit.
- 2.2. Document D3 discloses (see the abstract, the figure, and the description page 5, paragraph 7 - page 5, paragraph 1) a transaction management system wherein a central control unit records the time of the transaction. The remote control unit further keeps a watch on the amount of cash and notes available in the dispenser to ensure that there will be sufficient charge in the unit to enable the apparatus to continue functioning.
- 2.3. Document D4 discloses (see the abstract) a transaction management system wherein each till operator is required to log in when they are to carry out transactions at a station.
- 2.4. Document D5 discloses (see abstract and the description page 1, lines 4 - 90) a transaction management system comprising a cheque writing apparatus for printing an identification mark on each cheque relating to payee identification.
- 2.5. Document D6 discloses (see abstract and figure 1) a pneumatic cash transfer system enabling cash to be transferred between a cashier station 1 and a remote cash deposit box 4.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/00455

3. Dependent claims 2-5, 7-11, 17-20, 22-26 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, because these additional features are either known or suggested by citations D1-D6 (see paragraph 2 above) or are apparently between the scope of normal practice of the skilled man.
4. According to the applicant (see page 2, paragraph 2 of the letter of reply dated 23.03.01), citation D1 would not disclose entering information relating to the transaction to which the payment corresponds.

Document D1 discloses a point-of-sale loading unit 16 which automatically feeds bank notes into the cassette 10 (see abstract). Although document D1 does not explicitly disclose that the value of the transaction is entered, this feature appears implicit since D1 relates to a point-of-sale unit. It is generally known that an electronic point of sale comprises the features mentioned on page 1, second paragraph of the present application and are therefor implicit from the disclosure of D1.

Certain defects in the international application

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D6 is not mentioned in the description, nor are these documents identified therein.

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 00455	International filing date (day/month/year) 11/02/2000	(Earliest) Priority Date (day/month/year) 12/02/1999
Applicant REDDING, James		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ None of the figures.

TENT COOPERATION TRE Y

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 02 November 2000 (02.11.00)	
International application No. PCT/GB00/00455	Applicant's or agent's file reference
International filing date (day/month/year) 11 February 2000 (11.02.00)	Priority date (day/month/year) 12 February 1999 (12.02.99)
Applicant REDDING, James	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
12 September 2000 (12.09.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Pascal Piriou Telephone No.: (41-22) 338.83.38
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